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Northeastern Forest Experiment Station

Upper Darby, Pennsylvania
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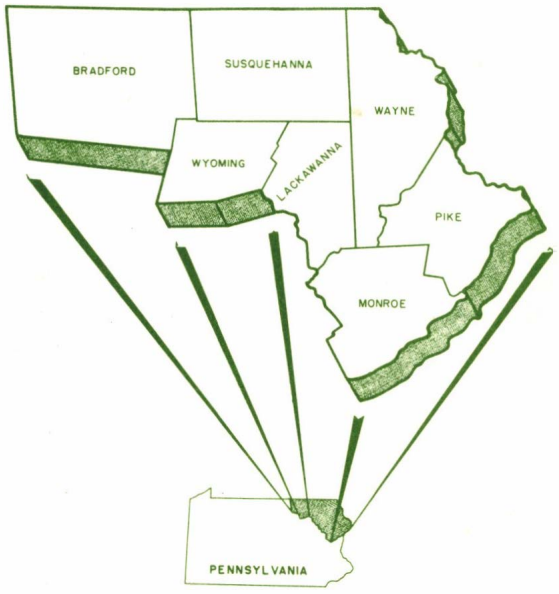
Forest Statistics

for the

Northeastern Section

of Pennsylvania



Forest Statistics Series
Pennsylvania No. 5

1956

FOREWORD

This is the fifth in a new series of reports about forest areas and timber volumes in Pennsylvania. It is a product of the Forest Survey of the Northeast, carried on by the Northeastern Forest Experiment Station as part of the nationwide survey being made by the Forest Service, U. S. Department of Agriculture.

The Pennsylvania State Planning Board provided the aerial photographs used in the survey. The Pennsylvania Department of Forests and Waters provided office space and gave other valuable assistance.

Field work in the Northeastern Section of Pennsylvania was supervised by N. B. Griswold. The statistical procedures used were developed by C. Allen Bickford. Computations were made under the supervision of Roland H. Ferguson.

Ralph W. Marquis

RALPH W. MARQUIS
Director

CONTENTS

	Page
GENERAL	1
Forest area	2
Ownership	2
Forest types	3
Forest stands	3
Timber volume	3
Pulpwood volume	4
TABLES	
Land area	5
Commercial forest-land area	6
Timber volume	8
Average volume per acre	10
Pulpwood volume	10
APPENDIX	
Definitions of terms	11
Forest survey methods	14
Accuracy of the estimates	14
Species tallied	15

Forest Statistics

for the

Northeastern Section

of Pennsylvania

Prepared By The

DIVISION OF FOREST ECONOMICS

Northeastern Forest Experiment Station
Forest Service, U.S. Dept. Agriculture

GENERAL

THE NORTHEASTERN SECTION of Pennsylvania is bounded on the north by the New York state line and on the east by the Delaware River. It embraces seven counties. Bradford and Susquehanna Counties lie along the New York-Pennsylvania state line. Directly below Susquehanna County are Wyoming and Lackawanna Counties. Lying along the Delaware River are Wayne, Pike, and Monroe Counties.

There is an excellent network of improved roads and railroads in this Section. Two major highways bisect the area: U. S. 6 running east and west and U. S. 11 running north and south. Six railroads have their main lines or branch lines extending into the coal fields in this section. Five of these railroads enter Pennsylvania's fourth-largest city (1950) of Scranton, in Lackawanna County.

This area is characterized by extensive forests, especially in the southeastern counties, by rugged topography, and by many streams and lakes. The Susquehanna River dips into the northern part of Susquehanna County and twists and

turns southeasterly through the heart of Bradford and Wyoming Counties. The Delaware River and its tributaries drain all of Pike and most of Wayne County.

Natural resources of this section are coal (around 1930 one-third of all anthracite mined in the United States came from within 16 miles of Scranton), timber, agricultural land (principally for the dairy industry in Susquehanna and Wyoming Counties), minerals, water (one of Pennsylvania's largest artificial lakes, Lake Wallenpaupack, was created for electrical power), and recreational areas, especially in the Pocono Mountains region.

Much of the area is rich in wild, beautiful scenery. The extensive forests and moderately high altitudes have made Monroe and Pike Counties one of the popular playgrounds of the Nation. Gateway to the heavily-used vacation land in the Poconos is the picturesque Delaware Water Gap. The latest State Park, Tobyhanna State Park in northern Monroe County, is only slightly more than 100 miles from the East's two large centers of population--New York City and Philadelphia. Total investment in recreational facilities in Monroe and Pike Counties alone exceeds 25 million dollars.

Monroe County is the home of one of the oldest forestry organizations in the country. The Pocono Forest Association was founded in 1920 for the purpose of fighting forest fires.

Forest Area

In the Northeastern Section, the total land area amounts to slightly more than 3 million acres. Sixty-one percent of this--1,825,200 acres--is commercial forest land. Some 11,300 acres of forest land have been reserved from timber cutting. About 8,300 acres of this is in the Tobyhanna State Park and almost 3,000 acres is in the Bruce Lake Natural Monument, a wilderness preserve.

Pike County is the most heavily forested in this part of the State. Ninety-one percent of its land area is commercial forest land. Monroe County comes next with 73 percent. Only two of the seven counties in the Section--Bradford and Susquehanna--have commercial forest land amounting to less than 50 percent of their total land area.

Ownership

A little more than 11 percent of the commercial forest land is publicly owned. The State owns most of this forest land, 201,100 acres. Federally owned forest land,

administered by the Soil Conservation Service, amounts to 2,300 acres. Forest land owned by counties and municipalities comes to 1,900 acres.

Farmers own almost 30 percent of all the privately owned forest land, some 466,000 acres. The rest of the privately owned forest land is made up of numerous small holdings and nine large holdings of over 5,000 acres each. The larger acreages are owned by coal companies, a hunting and fishing club, a water company, and individuals.

Forest Types

Hardwood forest types predominate. They occupy 93 percent of the commercial forest-land area. The sugar maple-beech-yellow birch forest type makes up 45 percent of the total, or 815,300 acres. More than two-thirds of the forest land in Susquehanna and Wayne Counties are in this type.

The oak types account for almost a third of the forest area, but almost half the area in oak types is in the less important chestnut oak type. The transitional aspen-gray birch type occupies another 13 percent of the commercial forest land.

Other hardwood forest types--principally ash-elm-maple and scrub oak types--make up 6 percent of the total. Of the 7 percent of the forest-land area in softwood types, almost half is in the hemlock types. The other softwood types are predominantly white pine and pitch pine.

Forest Stands

Sawtimber stands occupy almost one-fifth of the commercial forest land. Sawtimber stands of more than 5,000 board feet per acre occupy only 4 percent of the forest area, and yet they carry more than one-fifth of the total board-foot volume.

Poletimber stands occupy the largest area--47 percent of the total forest-land area. One-third of the forest land is in seedling-and-sapling stands and nonstocked forest areas, but only a fifth of this area is poorly stocked or nonstocked.

Timber Volume

Growing stock in the Northeastern Section amounts to 1¼ billion cubic feet. Of this, 525 million--a little more than 40 percent--are in sawtimber trees, and 739 million are in poletimber trees.

Included in this growing stock are 2 billion board feet (log scale, International ¼-inch rule) of sawtimber. Four species--beech, red maple, sugar maple, and basswood--make up more than half the hardwood volume. The softwood species, mostly hemlock and white pine, make up 21 percent of the total.

Pulpwood Volume

According to pulpwood specifications developed by the Northeastern and Appalachian Technical Committees of the American Pulpwood Association, practically all of the growing stock is suitable for use by the pulp industry--including some large sawlogs and veneer-log material. In terms of these specifications, there are almost 15 million rough standard cords of pulpwood bolts.

Hardwood species account for 88 percent of the total pulpwood volume; of this, about 60 percent is in the "hard" hardwoods--principally sugar maple, beech, and the oaks. Red maple and aspen are abundant "soft" hardwoods. The pulpwood volume in the softwood species is predominantly white pine and hemlock.

Pulpwood stands averaging better than 5 cords per acre cover 60 percent of the commercial forest land. Of this, about one-third carries more than 15 cords per acre. The remaining 40 percent of the forest is more lightly stocked.

Table 1.--Land area by major classes, 1954

Class of land[1]	Area	
	Acres	Percent
Forest land:		
Commercial	1,825,200	61
Noncommercial[2]	11,300	(3/)
All forest land	1,836,500	61
Nonforest land	1,192,600	39
All land[4]	3,029,100	100

[1] See Appendix for definitions.

[2] The acreage in State Parks that has been reserved from commercial timber cutting.

[3] Less than 1 percent.

[4] Census of Agriculture, 1950. Water areas of 1 to 40 acres are included in the estimate of nonforest acreage.

Table 2.--Land area and commercial forest-land area by county, 1954

County	Land area	Commercial forest-land area	
	Acres	Acres	Percent
Bradford	734,100	312,800	43
Lackawanna	290,600	186,900	64
Monroe	391,000	287,100	73
Pike	348,800	317,600	91
Susquehanna	535,000	264,800	49
Wayne	476,200	309,500	65
Wyoming	253,400	146,500	58
All	3,029,100	1,825,200	61

Table 3.--Commercial forest-land area by ownership, 1954

Ownership class	Acreage held	
	Acres	Percent
Private:		
Farm forest land[1]	466,400	26
Other private	1,153,500	63
Total private	1,619,900	89
Public:		
State[2]	201,100	11
Federal[3]	2,300	(4/)
Municipal	1,200	(4/)
County	700	(4/)
Total public	205,300	11
All ownerships	1,825,200	100

[1]Census of Agriculture, 1950.

[2]Includes 128,300 acres of State Game Lands and 69,800 acres of State Forest Lands.

[3]Entire area administered by the Soil Conservation Service.

[4]Less than 1 percent.

Table 4.--Commercial forest-land area by forest type, 1954

Forest type	Area	
	Acres	Percent
Sugar maple-beech-yellow birch	815,300	45
Chestnut oak	271,800	15
Aspen-gray birch	235,800	13
Red oak	155,000	8
White oak	116,400	6
Other hardwood types[1]	103,300	6
Hemlock	55,300	3
Other softwood types[2]	72,300	4
All types	1,825,200	100

[1]Includes 28,800 acres of ash-elm-maple type; 28,300 acres of scrub oak type; and 20,800 acres of northern hardwood-white pine type.

[2]Includes 33,800 acres of white pine type and 25,800 acres of pitch pine type.

NORTHEASTERN SECTION OF PENNSYLVANIA

Table 5.--Commercial forest-land area by forest-type group and stand-size class, 1954

Forest-type group	Sawtimber stands	Poletimber stands	Seedling-and-sapling stands and other areas	Total area
	Acres	Acres	Acres	Acres
Sugar maple-beech-yellow birch	200,200	437,700	177,400	815,300
Aspen-gray birch	9,200	65,800	160,800	235,800
Red oak	32,700	58,200	64,100	155,000
Other hardwood types	47,300	247,000	197,200	491,500
Softwood types	58,800	39,100	29,700	127,600
All types	348,200	847,800	629,200	1,825,200
Percent	19	47	34	100

Table 6.--Commercial forest-land area by stand size class and drainage area, 1954

Stand-size class	Drainage area		Total
	Delaware River	Susquehanna River	
	Acres	Acres	Acres
Sawtimber stands:			
More than 5,000 board feet per acre	10,600	57,700	68,300
1,500 to 5,000 board feet per acre	107,400	172,500	279,900
Poletimber stands:			
More than 600 cubic feet per acre	172,200	211,200	383,400
200 to 600 cubic feet per acre	280,100	184,300	464,400
Other areas[1]	368,500	260,700	629,200
Total	938,800	886,400	1,825,200
Percent	51	49	100

[1]Includes 543,100 acres in seedling-and-sapling stands.

NORTHEASTERN SECTION OF PENNSYLVANIA

Table 7.--Net volume of live timber on commercial forest land by species, 1954

Species	Growing stock[1]	Sawtimber[2]	Suitable for pulpwood[3]
	Thousand cu.ft.	Thousand bd.ft.	Thousand cords
Hemlock	103,400	251,100	1,165
White pine	40,400	144,700	455
Pitch pine	10,000	25,700	113
Other softwoods	5,100	11,500	57
All softwoods	158,900	433,000	1,790
Red maple	240,600	231,300	2,808
Sugar maple	145,800	195,100	1,702
Beech	138,800	305,800	1,620
Chestnut oak	103,900	115,500	1,213
Aspen	91,000	53,100	1,062
Northern red oak	71,300	124,600	832
White oak	56,800	95,200	663
Black cherry	48,200	99,200	562
Basswood	48,000	139,600	560
Ash	42,900	58,400	501
Sweet birch	36,900	58,800	431
Yellow birch	22,500	35,900	263
Other soft hardwoods	16,300	29,900	190
Other hard hardwoods	41,900	68,000	489
All hardwoods	1,104,900	1,610,400	12,896
All species	1,263,800	2,043,400	14,686

[1]See Appendix for definitions. Growing stock includes pulpwood and sawtimber.

[2]Log scale, International ¼-inch rule.

[3]4-foot bolts, including bark.

Table 8.--Net volume of live timber on commercial forest land by diameter class, 1954

Diameter class[1] (in inches at breast height)	Growing stock	Saw-timber
	Thousand cu.ft.	Thousand bd.ft.
Softwoods:		
6	20,800	--
8	24,100	--
10	31,000	99,300
12	29,700	106,300
14	18,100	67,400
16 +	35,200	160,000
All softwoods	158,900	433,000
Hardwoods:		
6	211,300	--
8	283,500	--
10	199,200	--
12	147,200	514,400
14	117,100	472,100
16	73,100	302,100
18	29,300	130,200
20	26,600	124,800
22 +	17,600	66,800
All hardwoods	1,104,900	1,610,400
Total	1,263,800	2,043,400

[1]The midpoint of each 2-inch diameter class is indicated.

Table 9.--Net volume of live timber on commercial forest land by forest type, 1954

Forest type	Growing stock	Saw-timber	Suitable for pulpwood
	Thousand cu.ft.	Thousand bd.ft.	Thousand cords
Sugar maple-beech-yellow birch	728,300	1,281,600	8,464
Chestnut oak	151,900	140,900	1,765
Red oak	104,900	194,100	1,219
Aspen-gray birch	91,300	51,700	1,061
Other hardwood types	81,700	113,200	949
Hemlock	61,300	132,400	712
Other softwood types	44,400	129,500	516
All types	1,263,800	2,043,400	14,686

Table 10.--Average net volume of live timber per acre of commercial forest land, by stand-size class, 1954

Stand-size class (and acreage of each class)	Growing stock	Sawtimber
	Cubic feet	Board feet
Sawtimber stands:		
More than 5,000 bd.ft. per acre (68,300 acres)	2,100	6,500
1,500 to 5,000 bd.ft. per acre (279,900 acres)	1,400	3,000
Poletimber stands:		
More than 600 cu.ft. per acre (383,400 acres)	1,000	1,000
200 to 600 cu.ft. per acre (464,400 acres)	500	500
Other[1] (629,200 acres)	100	200
Average, all classes[2] (1,825,200 acres)	700	1,100

[1]Includes seedling-and-sapling stands and nonstocked areas.

[2]Hardwoods constitute 87 percent of the total growing stock or 79 percent of the total sawtimber volume. The average cubic volume of the total commercial forest area is equivalent to 9 cords per acre.

Table 11.--Area and volume by pulpwood volume-per-acre class, 1954

Pulpwood class	Area	Volume
	Thousand acres	Thousand cords
Less than 5 cords per acre	719	1,295
5 to 15 cords per acre	725	6,117
More than 15 cords per acre	381	7,274
Total	1,825	14,686

APPENDIX

DEFINITIONS OF TERMS

Forest Area

Forest-land area.--Includes (a) lands that are at least 10 percent stocked by trees of any size and capable of producing timber or other wood products, or of exerting influence on the climate or on the water regime; (b) land from which the trees described in (a) have been removed to less than 10 percent stocking and which has not been developed for other use; and (c) afforested areas. (Forest tracts of less than 1 acre, isolated strips of timber less than 120 feet wide, and abandoned fields and pastures not yet 10 percent stocked are excluded.)

Commercial forest-land area.--Forest land that is (a) producing, or physically capable of producing, usable crops of wood (usually sawtimber), (b) economically available now or prospectively, and (c) not withdrawn from timber utilization.

Noncommercial forest-land area.--Forest land (a) withdrawn from timber utilization through statute, ordinance, or administrative order but which otherwise qualifies as commercial forest land, and (b) incapable of yielding usable wood products (usually sawtimber) because of adverse site conditions.

Forest Types

Forest types are classified according to the species or species group that accounts for the major portion of the stand in terms of cubic feet in sawtimber and poletimber stands, or the number of stems in seedling-and-sapling stands.

Stand-Size Classes

Sawtimber stands.--Stands with sawtimber trees having a minimum net volume per acre of 1,500 board feet, International $\frac{1}{4}$-inch rule.

Poletimber stands.--Stands failing to meet the sawtimber stand specification, but at least 10 percent stocked

with poletimber and larger (5.0 inches and larger) trees, and with at least half the minimum stocking in poletimber trees. (Poletimber stands carry at least 200 cubic feet per acre.)

Seedling-and-sapling stands.--Stands not qualifying as either sawtimber or poletimber stands, but having at least 10 percent stocking of trees of commercial species and with at least half the minimum stocking in seedling-and-sapling trees.

Other areas.--Forest-land areas not qualifying as sawtimber, poletimber, or seedling-and-sapling stands. (Includes nonstocked areas.)

Tree Classes

Sawtimber trees.--Trees of commercial species that contain at least one merchantable sawlog as defined by regional practice and that are of the following minimum diameters at breast height (d.b.h.): Softwoods 9.0 inches and hardwoods 11.0 inches. (All butt sawlogs are considered merchantable. Where the butt is defective, upper sawlogs are considered merchantable if they account--in terms of aggregate net volume--for 50 percent or more of the gross volume below the top of the uppermost sawlog. Softwood sawlogs are at least 6.0 inches in diameter inside bark at small end; 8 to 16 feet in length; sound and straight enough to be manufactured into standard lumber. The smaller logs are generally free of surface defects other than small tight knots. Hardwood sawlogs are at least 8.0 inches in diameter inside bark at small end; 8 to 16 feet in length; suitable for sawing into standard lumber, construction timbers, or ties.)

Poletimber trees.--Trees 5.0 inches d.b.h. and larger of commercial species that do not meet the specifications for sawtimber trees but do meet regional specifications of species, soundness, and freedom from defect. (These are the trees that are straight and clear enough to make sawtimber trees eventually.)

Seedling-and-sapling trees.--Trees of commercial species less than 5.0 inches in diameter at breast height.

Cull trees.--Live trees of sawtimber or poletimber size that are unmerchantable for sawlogs now or prospectively because of defect, rot, or species.

Timber Volume

Growing stock.--Net volume, in cubic feet, of live sawtimber trees and live poletimber trees from stump to a minimum 4.0-inch top (of central stem) inside bark.

Live sawtimber volume.--Net volume in board feet, International ¼-inch rule, of live sawtimber trees.

Pulpwood.--Net volume in rough, standard cords (bark included) of growing stock, excluding sound defect as well as unsound defect.

Pulpwood Volume

The pulpwood specifications used in this report are those set up by the Northeastern and Appalachian Technical Committees of the American Pulpwood Association.

Pulpwood trees.--Live trees of commercial species, 5.0 inches d.b.h. and larger, containing at least two contiguous pulpwood bolts and with 50 percent or more of the main stem volume usable for pulp. (A merchantable pulpwood bolt is a section of the main stem of a pulpwood tree, 4 feet long; 4.0 inches or larger inside bark at the small end; free from any indication of rot, charred wood, metal or hollow center; and contiguous to one or more sections meeting these same requirements. Crotches are excluded; sweep or crook in any section shall exclude the bolt if a line from the center of the top cut to the center of the bottom cut passes outside the wood at any point. Most of the sawtimber and poletimber trees are also defined as pulpwood trees.)

Pulpwood volume.--Net volume in standard cords (including bark), of the main stem of pulpwood trees, from the stump to a point where the top breaks up into branches, or to a minimum top diameter of 4.0 inches (inside bark). Deductions are made for all portions of the stem that fail to meet pulpwood bolt requirements.

Pulpwood Stands

Less than 5 cords per acre: Stands with trees 5.0 inches (d.b.h.) and larger that meet pulpwood specifications, and with a net volume per acre of less than 400 cubic feet. (Includes seedling-and-sapling stands and nonstocked areas.)

5 to 15 cords per acre: Stands with trees 5.0 inches (d.b.h.) and larger that meet pulpwood specifications, and with a net volume per acre ranging from 400 to 1,200 cubic feet.

More than 15 cords per acre: Stands with trees 5.0 inches (d.b.h.) and larger that meet pulpwood specifications, and with a net volume per acre of more than 1,200 cubic feet.

FOREST SURVEY METHODS

These forest statistics are based on information gathered from aerial photographs and from sample plots examined on the ground.

First, photo-interpretation plots were marked off on the aerial photographs. These plots were distributed uniformly by mechanical means over photographs of the entire district. Trained photo-interpreters then classified each photo-plot as either forest or nonforest. Forest plots were classified further according to stand-size and forest type.

Field crews inspected some of the photo-plots on the ground. Enough plots were selected at random so as to attain a specified level of statistical accuracy. Species and volume data were collected on these ground plots; and the photo classification of stand size and forest type was verified or--if necessary--changed.

The survey was designed for maximum efficiency in estimating total cubic volume to meet the national standards of accuracy.

ACCURACY OF THE ESTIMATES

The estimates in this report may contain two kinds of error. First, photo-interpreters may make mistakes of judgment and fieldmen may make mistakes in measuring or recording. There is no practical way of finding out just how often such errors occur. But they are kept to a minimum by closely checking all phases of the work.

The second kind of error is associated with sampling procedures. The size of this sampling error can be measured. In the Northeastern Section of Pennsylvania the probabilities are 2 out of 3 that the actual forest area is within $\pm$ 3.4 percent of the estimated forest area, that the actual cubic-foot volume is within $\pm$ 4.2 percent of the estimated cubic-foot volume, and that the actual board-foot volume is within $\pm$ 7.7 percent of the estimated board-foot volume. This does not include any mistakes in measurement or classification.

These percentages show that the area estimates are more accurate than the volume estimates, and that the cubic-

foot estimates are more accurate than the board-foot estimates.

In each of the tables, the total figures are more accurate than the subtotals. The subtotals are more accurate than any of the individual figures. Figures that are small in relation to totals are subject to larger sampling errors.

SPECIES TALLIED

The various commercial tree species tallied in the Northeastern Section of Pennsylvania are listed below. Approved common names[1] are shown in parentheses if they differ from the brief name used in the tables. Other tree species may occur in the area, but unless they were tallied on the field plots they were not included in the following list.

Softwoods

Hemlock (Eastern hemlock)	- Tsuga canadensis
White pine (Eastern white pine)	- Pinus strobus
Pitch pine	- Pinus rigida
Other softwoods	
(Red spruce)	- Picea rubens
(Red pine)	- Pinus resinosa

Soft Hardwoods

Red maple	- Acer rubrum
Quaking aspen	- Populus tremuloides
Black cherry	- Prunus serotina
Basswood (American basswood)	- Tilia americana
Other soft hardwoods	
(Yellow-poplar)	- Liriodendron tulipifera
(Paper birch)	- Betula papyrifera
(Elm)	- Ulmus species
(Butternut)	- Juglans cinerea
(Sweetgum)	- Liquidambar styraciflua
(Cucumbertree)	- Magnolia acuminata
(Black typelo)	- Nyssa sylvatica
(American sycamore)	- Platanus occidentalis

[1]Little, Elbert L., Jr. Check list of native and naturalized trees of the United States (including Alaska). U.S. Dept. Agr., Agr. Handb. 41. 472 pp. 1953.

Hard Hardwoods

Sugar maple	- Acer saccharum
Beech (American beech)	- Fagus grandifolia
Chestnut oak	- Quercus prinus
Northern red oak	- Quercus rubra
White oak	- Quercus alba
White ash	- Fraxinus americana
Sweet birch	- Betula lenta
Yellow birch	- Betula alleghaniensis
Other hard hardwoods	
(Black oak)	- Quercus velutina
(Scarlet oak)	- Quercus coccinea
(Hickory)	- Carya species
(Black locust)	- Robinia pseudoacacia
(Black walnut)	- Juglans nigra

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